

Remarks

The above Amendments and these Remarks are in reply to the Office Action mailed September 29, 2004. No fee is due.

Claims 1-11 were pending in the Application prior to the outstanding Office Action. In the Office Action, the Examiner rejected claims 1-11. The present Response cancels claims 1, 4 and 6 and amends claims 5 and 8, leaving for the Examiner's present consideration claims 2, 3, 5 and 7-11. Reconsideration of the rejections is requested.

I. CLAIM OBJECTIONS

The Examiner objected to claim 8 on the ground that it should be dependent from independent claim 7 instead of claim 6.

This typographical error has now been corrected.

II. ART REJECTIONS

The Examiner has rejected all claims 1-11 either as being anticipated by Griswold or as being obvious over a combination of Griswold and Liaw. Applicants will respond to the rejections in claim number sequence.

A. Independent Claim 1

The Examiner rejected claim 1 as being anticipated by Griswold. This rejection is considered moot since claim 1 has been canceled.

B. Independent Claim 2

The Examiner rejected claim 2 as being anticipated by Griswold.

Griswold teaches the formation of a floating gate 22 containing two sublayers: a lower sublayer 18 formed of polysilicon, and an upper sublayer 20 formed of amorphous silicon. As described in Griswold, these two sublayers are formed in separate processing steps. See, for example, Figs. 3 and 4 of Griswold, and accompanying text.

Applicants' claim 2, however, calls for, among other things:

"A structure having a first region composed of amorphous silicon ..., a second region composed of polysilicon ..., and an intermediate region between the first and second regions, the intermediate region comprised partially of amorphous silicon and partially of polysilicon." (emphasis added)

Griswold does not teach the "intermediate region" called for in Applicants' claim 2. There is no such intermediate region between Griswold's poly sublayer 18 and amorphous silicon sublayer 20. And certainly nothing in Griswold teaches that such an intermediate region is to be comprised "partially of amorphous silicon and partially of polysilicon."

Accordingly, since Griswold fails to teach an element called for in Applicants' claim 2, it is respectfully submitted that Griswold cannot anticipate. Claim 2 therefore should be patentable.

C. Dependent Claim 3

Applicants' claim 3 depends from independent claim 2 and should therefore be patentable for at least the same reasons as independent claim 2.

In addition, claim 3 and a limitation that the intermediate region have "a continuous phase distribution from amorphous silicon to polysilicon."

Griswold, which does not teach the presence of any intermediate region at all, certainly does not teach that such an intermediate region has a "continuous phase distribution from amorphous silicon to polysilicon."

Accordingly claim 3 should be patentable for this reason as well.

D. Independent Claim 4

The Examiner rejected claim 4 as being anticipated by Griswold. This rejection is considered moot since claim 4 has been canceled.

E. Claims 5-6

The Examiner rejected independent claim 5 and its dependent claim 6 as being anticipated by Griswold. Claim 6 has now been canceled, and its limitations have been incorporated into independent claim 5.

As amended, claim 5 calls for, among other things, a structure having a "first region comprising amorphous silicon, and adjacent to [a] first surface", a "second region comprising polysilicon, and adjacent to [a] second surface", and "an intermediate region between the first and second surfaces, wherein the intermediate region has a phase distribution that transitions from amorphous silicon to polysilicon."

As pointed out above, Griswold does not teach any "intermediate region that has a phase distribution that transitions from amorphous silicon to polysilicon."

It is therefore respectfully submitted that Griswold fails to teach an element called for in Applicants' claim 5 as amended, and therefore cannot anticipate. Claim 5 should be patentable.

F. Independent Claim 7

The Examiner rejected claim 7 as being obvious over a combination of Griswold and Liaw.

Griswold's teachings are described above. Liaw teaches that amorphous silicon may be deposited in a range from approximately 200-550° while polysilicon may be deposited in the range of approximately 55-750°.

Liaw discloses these temperatures, but does not teach that both polysilicon and amorphous silicon can be formed in the same process step by transitioning the temperature from one temperature range to the other during the process step. It is not obvious to make such a transition during a process step since most process steps involve the establishment of one set of environmental conditions, and try to maintain such conditions constant throughout the entire process step.

Claim 7, by contrast, calls for among other things a step of:

"controlling the temperature during the step of depositing the silicon layer, from a starting temperature favoring the formation of polysilicon, to and ending temperature favoring the formation of amorphous silicon." (emphasis added)

As mentioned, Liaw fails to teach a step of controlling the temperature during the process step, so as to favor the polysilicon formation at the start and so as to favor and amorphous silicon formation at the end.

Is therefore respectfully submitted that even in combination, Griswold and Liaw fail to teach an element called for in Applicants' claim 7 and therefore cannot anticipate. Claim 7 therefore should be patentable.

G. Dependent claim 8

Claim 8 depends from independent claim 7 and therefore should be patentable for at least the same reasons. In addition, claim 8 calls for specific starting and ending temperatures.

Claim 8 calls for the starting temperature to be approximately 620°, and the ending temperature to be in the range from about 500° to about 550°. The temperatures at both points in time are within the temperature ranges prescribed by Liaw, but Liaw's ranges are much broader.

Liaw says to use a reactor temperature in the range of approximately 200-550 degrees for the deposition of amorphous silicon, but Applicants' claim 8 calls for the temperature to be specifically in the range of about 500° to about 550°. The preference of this part of Liaw's range over other parts of Liaw's range is not taught in Liaw, and it is not obvious from Liaw.

Similarly, Liaw says to use a reactor temperature in the range of 55-750° for the deposition of polysilicon. But Applicants' claim 8 specifically calls for the temperature to be approximately 620°. Again, the preference for this narrow region of Liaw's much larger range, over other parts of Liaw's range, is not taught in Liaw and is not obvious from Liaw.

Accordingly, since neither Griswold nor Liaw teach or suggest the specific temperatures and temperature ranges called for in Applicants' claim 8, is respectfully submitted that claim 8 should be patentable for this reason as well.

H. Independent Claim 9

The Examiner rejected claim 9 also over the combination of Griswold and Liaw. But claim 9, like claim 7, calls for among other things a step of "controlling the temperature during the step of the depositing the silicon layer," from a higher starting temperature to a lower ending temperature.

Again, Liaw fails to teach this step of controlling the reactor temperature "during the step of depositing the silicon layer".

Griswold appears to teach two separate steps for forming the two separate sublayers, and while Liaw teaches temperature ranges for forming each such sublayer, he does not teach controlling the temperature "during" the step of depositing the silicon layer.

I. Dependent Claim 10

Claim 10 depends from claim 9 and should be patentable for at least the same reasons.

J. Dependent Claim 11

Claim 11 depends from claim 10 and should be patentable for at least the same reasons as each of claims 9 and 10.

Claim 11 also as limitations concerning specific starting and ending temperatures, similar to those called for in Applicants' claim 8. Claim 11 should therefore be patentable also for the same reasons as set forth above with respect to claim 8.

III. OTHER MATTERS AND CONCLUSION

The references cited by the Examiner but not relied upon have been reviewed, but are not believed to render the claims unpatentable, either singly or in combination.

In light of the above, it is respectfully submitted that all of the claims now pending in the subject patent application should be allowable, and a Notice of Allowance is requested. The Examiner is respectfully requested to telephone the undersigned if he can assist in any way in expediting issuance of a patent.

The Commissioner is authorized to charge any underpayment or credit any overpayment to Deposit Account No. 50-0869 for any matter in connection with this response, including any fee for extension of time, which may be required.

Respectfully submitted,

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